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(54) A washing agent dispensing device for a washing machine for household use, in particular a dishwasher, and washing machine thereof

(57) The present invention relates to a washing agent dispensing device (10) for a washing machine (1) for household use, in particular a dishwasher, said dispensing device (10) comprising:
- at least one compartment (11) associated with a lid (12) for sealing a detergent agent into said at least one compartment (11);
- a locking mechanism (13) for holding the lid (12) in the closed position;
- activating means (30, 31) for activating said locking mechanism (13) in order to open the lid (12);
- a container (20) for containing a rinse aid agent, in particular said container (20) being associated with release means (21) which allow the rinse aid agent to be dispensed during a rinse step.

The invention is **characterized in that** said activating means comprise a movable member (30) rotatably mounted about a pin (P) and an actuating element (31) secured through a first end (31A) to the dispensing device (10) and through a second end (31B) to the movable member (30), said actuating element (31) being adapted to drive the movable member (30):
- in a first rotation direction (S1) about said pin (P) in order to activate said locking mechanism (13) and open the lid (12);
- in a second rotation direction (S2) about said pin (P) in order to activate said release means (21) and dispense the rinse aid agent contained in the container (20),

said dispensing device (10) comprising elastic means (40) associated with said movable member (30) so as to allow switching from said first rotation direction (S1) to said second rotation direction (S2).

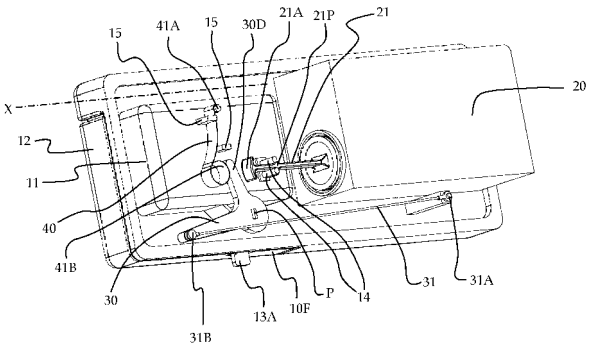


Fig. 2

EP 2 478 819 A1

Description

[0001] The present invention relates to a washing agent dispensing device for a washing machine for household use, in particular a dishwasher, according to the preamble of claim 1.

[0002] The present invention also relates to a method of operation of the dispensing device and to a related washing machine for household use, in particular a dishwasher.

[0003] Washing machines known in the art comprise a control system for managing and controlling the operation of the washing machine, said control system being adapted to implement at least one wash program.

[0004] For example, washing machines, in particular dishwashers, currently available on the market are usually fitted with at least some of the following wash programs:

- a basic wash program, to be used for washing crockery with a normal degree of dirtiness at a certain drying stage. Such a program typically comprises an initial cold prewash step, a hot wash step, two cold rinse steps, a hot rinse step, and a final drying step;
- an intensive wash program, to be used for very dirty crockery, or when food residues are particularly hard to remove (e.g. very dry or burned). Such a program typically comprises an initial hot prewash step, a hot wash step, a first cold rinse step, a second cold rinse step, a third hot rinse step, and a final drying step;
- an economy wash program, to be used for washing crockery which is not very dirty or for partial loads. Such a program typically comprises an initial cold prewash step, a hot wash step, a first cold rinse step, a second hot rinse step, and a final drying step.

[0005] Consequently, known washing machines comprise a tub in which crockery is cleaned during a wash step of the above-mentioned wash program by a wash liquid, in particular water added with a detergent agent.

[0006] The wash program also includes at least one rinse step, wherein the crockery is subjected to the action of a rinse liquid, in particular water added with a rinse aid agent.

[0007] Therefore, known washing machines are fitted with suitable dispensing devices, which comprise distinct compartments or reservoirs adapted to contain different washing agents specific for said steps of a wash program; said washing agents typically consist of a (powder) detergent, which is dispensed during the wash step, and a liquid additive, such as rinse aid, which is dispensed during the rinse step, in particular during a hot rinse step. In those cases wherein the use of detergent is also recommended for the prewash step, the same detergent also used for the wash step is usually employed.

[0008] A known dispensing device generally consists of a body usually housed in the inner panel of the front door of the dishwashing machine; said body comprises at least one compartment for the dose of detergent required by the wash step, said compartment being provided with a lid which is opened at the appropriate instant of the wash program by the machine's programming device.

[0009] In addition to said single-dose wash detergent compartment, the body of the dispensing device usually also includes a dispenser of liquid additive, such as a rinse aid agent, to be dispensed during the rinse step.

[0010] As regards the use of detergent also during the prewash step, some dispensing devices may be fitted with an additional compartment, distinct from the one containing the detergent intended for the wash step. In such cases, the lid that closes the wash detergent compartment usually extends to cover also said additional compartment.

[0011] However, washing machines, in particular dishwashers, known in the art suffer from many drawbacks.

[0012] In particular, a very important problem of prior-art solutions is that they do not ensure that the washing agents are released into the wash liquid reliably and constantly over time.

[0013] A further drawback of prior-art solutions is that they require that the quantity of washing agents, in particular of rinse aid agent, that must be dispensed during the rinse step be set beforehand (e.g. mechanically) by the user, without offering the latter the possibility of having said dispensing process handled electronically and dynamically by the washing machine itself according to the specific requirements of a certain wash program.

[0014] The prior art also includes the washing machine described in US patent application No. US2004118434.

[0015] Said washing machine comprises a washing agent dispensing device which includes:

- a first shape memory element (also known in the art as SMA, which stands for "Shape Memory Alloy", or SMW, which stands for "Shape Memory Wire"), which allows opening a first cover for releasing detergent contained in at least a first compartment of the dispensing device;
- a second shape memory element associated with a second cover, for releasing a liquid additive or rinse aid agent to be dispensed during the rinse step, said rinse aid agent being contained in a second compartment of the dispensing device.

[0016] The dispensing device described in US patent application No. US2004118434 has some drawbacks as well, in that its implementation implies higher production costs, in particular due to the necessary duplication of the shape memory elements and of the mechanisms employed for releasing the detergent and the rinse aid agent.

[0017] Moreover, the dispensing device described in US patent application No. US2004118434 does not allow for a controlled, metered and measured release of said rinse aid agent contained in a second compartment of the dispensing device. In fact, upon actuation of the sec-

ond shape memory element, the above-described dispensing device causes a second cover to open and releases the entire quantity of rinse aid agent previously poured by the user into the second compartment of the dispensing device; as a consequence, the dispensing device described in US patent application No. US2004118434 does not allow to obtain a release handled in an electronic, dynamic and measured manner by the washing machine itself.

[0018] In this frame, it is the main object of the present invention to provide a washing agent dispensing device for a washing machine for household use, in particular a dishwasher, and a related washing machine, which are so designed as to overcome the drawbacks of the prior art.

[0019] It is another object of the present invention to provide a washing agent dispensing device for a washing machine for household use, in particular a dishwasher, and a related washing machine, which can ensure that the washing agents are released into the wash liquid reliably and constantly over time.

[0020] It is a further object of the present invention to provide a washing agent dispensing device, and a related washing machine, wherein the delivery of the washing agents, in particular of the rinse aid agent, can be handled in an electronic, dynamic and measured manner by the washing machine itself.

[0021] It is yet another main object of the present invention to provide a washing agent dispensing device for a washing machine for household use, in particular a dishwasher, and a related washing machine, which are so designed as to require lower production costs while at the same time ensuring a controlled, metered and measured release of the washing agents contained in the dispensing device, in particular of the rinse aid agent contained in a second compartment of said dispensing device.

[0022] Said objects are achieved by the present invention through a washing agent dispensing device for a washing machine for household use, in particular a dishwasher, and a related washing machine, incorporating the features set out in the appended claims, which are intended as an integral part of the present description.

[0023] Further objects, features and advantages of the present invention will become apparent from the following detailed description and from the annexed drawings, which are supplied by way of non-limiting explanatory example, wherein:

- Fig. 1 is a schematic view of a washing machine for household use, in particular a dishwasher, which incorporates the features of the present invention;
- Fig. 2 is a perspective view of the dispensing device according to the present invention;
- Figs. 3a to 7a are plan views of the dispensing device according to the present invention in different operating conditions;
- Figs. 3b to 7b are sectional views of the dispensing device according to the present invention, respectively in the same operating conditions as those shown in Figs. 3a to 7a.

[0024] Referring now to the annexed drawings, in Fig. 1 reference numeral 1 designates as a whole a washing machine for household use, in particular a dishwasher, according to the present invention.

[0025] The washing machine 1 comprises an electric or electronic control system SC for handling and controlling the operation of the washing machine 1, said control system SC being adapted to implement at least one wash program.

[0026] The washing machine 1 further comprises a tub 2 in which crockery is cleaned through washing means comprising a wash liquid; in particular, said at least one wash program comprises a wash step, wherein the wash liquid consists of water added with a detergent agent, and a rinse step, wherein the wash liquid consists of water added with a rinse aid agent. Whenever the use of a detergent agent is also recommended for a prewash step, the same detergent can be used as the one employed for the wash step.

[0027] The annexed drawings do not show the crockery, the wash liquid, the detergent agent and the rinse aid agent.

[0028] Said wash liquid (water added with detergent agent and/or rinse aid agent) is sprayed onto the crockery to be washed by means of at least one sprayer 3a, 3b; in particular, Fig. 1 shows a first sprayer 3a associated with a lower rack 4a and a second sprayer 3b associated with an upper rack 4b, said racks 4a, 4b being adapted to receive the crockery to be washed and rinsed.

[0029] Preferably, the washing machine 1 comprises a circuit for distributing the wash liquid inside said washing machine 1; in particular, said distribution circuit may comprise at least one delivery duct 5 associated with a pump 6, which allow the wash liquid to flow from a pit 7 to said first sprayer 3a and second sprayer 3b.

[0030] The washing machine 1 also comprises a dispensing device 10 for dispensing washing agents during the various steps of at least one wash program; the perspective view of Fig. 2 shows in particular a rear portion of the dispensing device 10.

[0031] Preferably, said dispensing device 10 is housed in the inner panel 9 of a front door 8 for loading the dishwasher 1, and said rear portion is that portion of the dispensing device 10 which is inserted into said inner panel 9.

[0032] Figs. 3a to 7a show rear views of the dispensing device 10 of the present invention in different operating conditions, whereas Figs. 3b to 7b are sectional views of the dispensing device 10 corresponding to the operating conditions illustrated in Figs. 2a to 6a.

[0033] Figs. 2 to 7b show that, in accordance with the present invention, the dispensing device 10 comprises:

- at least one compartment 11 associated with a lid

12 for sealing a detergent agent into said at least one compartment 11. For example, said detergent agent is dispensed during a wash step of a wash program, and may consist of powder or tablet detergent.

[0034] Said at least one compartment 11 can be designed in a manner such as to comprise a first compartment (not shown in the drawings) for containing a detergent agent for a wash step, and a second compartment (not shown in the drawings) for containing a detergent agent for a prewash step.

[0035] Preferably, the lid 12 rotates about an axis, designated X in Fig. 2, for causing said compartment 11 to open in order to release the detergent agent during a wash step; said lid 12 (which in Figs. 5b and 6b is shown in the wide open position) is preferably adapted to close the compartment 11 against the action of a spring (not shown) reacting between the dispensing device 10 and the lid 12 itself. It is apparent that the lid 12 according to the present invention may be so designed as to include a sliding or translating opening system, instead of being rotatable about said axis X.

[0036] The dispensing device 10 comprises a locking mechanism 13 for holding the lid 12 in the closed position; said locking mechanism preferably comprises an arm 13 adapted to rotate about a pin P, which arm is fitted with a tooth 13D adapted to engage with a serration 12D of the lid 12.

[0037] The tooth 13D of the arm 13 and the serration 12D of the lid 12 are visible in Figs. 3b, 4b and 7b; it should also be noted that the arm 13 has been drawn with a dashed line in Figs. 3a to 7a, in that said arm 13 is associated with a front portion of the dispensing device 10 and is not therefore directly visible in the rear views of the dispensing device 10 shown in Figs. 3a to 7a.

[0038] Preferably, the arm 13 is provided with an appendix 13A that protrudes from a slot 10F of the dispensing device 10, so as to allow the arm 13 to be manually operated by a user in order to open the lid 12 manually.

[0039] In addition, the dispensing device 10 comprises a container 20 for a rinse aid agent, in particular said container 20 being associated with release means 21 which allow the rinse aid agent to be dispensed during a rinse step,

[0040] In particular, said release means comprise a rod 21 associated with a small pump (not shown in the drawings) for pumping a predetermined quantity of rinse aid agent at each activation of the release means. It is clear that, in accordance with the present invention, the rod 21 can be associated with a valve (also not shown in the annexed drawings) instead of said small pump.

[0041] Preferably, the vertical movement of the rod 21 is limited by a pair of supports 14 (well visible in Fig. 2) associated with the dispensing device 10.

[0042] The dispensing device 10 further comprises activating means 30, 31 for activating said locking mechanism 13 in order to open the lid 12.

[0043] In accordance with the present invention, said activating means comprise a movable member 30 rotatably mounted about a pin P and an actuating element 31 secured through a first end 31A to the dispensing device 10 and through a second end 31B to the movable member 30, said actuating element 31 being adapted to drive the movable member 30:

- in a first rotation direction S1 (see dashed arrow S1 in Figs. 3a and 4a) about said pin P, in order to activate said locking mechanism 13 and open the lid 12;
- in a second rotation direction S2 (see dashed arrow S2 in Figs. 5a, 6a and 7a) about said pin P, in order to activate said release means 21 and dispense the rinse aid agent contained in the container 20,

said dispensing device 10 comprising elastic means 40 associated with said movable member 30, so as to allow switching from said first rotation direction S1 to said second rotation direction S2.

[0044] Preferably, the actuating element 31 consists of a single shape memory element, in particular of the monostable type, and the dispensing device 10 comprises power supply means including an electric circuit (not shown in the drawings) connected to the first end 31A and/or to the second end 31B of the shape memory element 31.

[0045] As known, in monostable shape memory elements the activation of the actuator through an electric circuit always causes the actuator to move from a first original condition to a second operating condition; when no longer activated, the actuator always returns into the first original condition.

[0046] In the case of the actuating element 31 according to the present invention, it can be in a first operating condition (shown in Figs. 3a, 5a and 7a), wherein it is not activated and has a certain first length L1; upon activation of the electric circuit connected to the first end 31A and/or to the second end 31B, the actuating element 31 can switch to a second operating condition (shown in Figs. 4a and 6a), wherein it is activated and has a certain second length L2, shorter than said first length L1. In Figs. 3a to 7a, said first length L1 and second length L2 are represented by a dash-dot-dot line.

[0047] As a consequence, the shape memory actuating element 31 according to the present invention can become shorter following the activation of the electric circuit connected to the first end 31A and/or to the second end 31B.

[0048] In a preferred embodiment, said first end 31A and second end 31B of the actuating element 31 are positioned on substantially opposite sides relative to said pin P.

[0049] As previously stated, the first end 31A of the actuating element 31 is associated with the dispensing device 10; it is however clear that the first end 31A of the actuating element 31 may also be directly associated with the washing machine 1.

[0050] As can be seen in the annexed drawings, the arm 13 and the movable member 30 are associated with each other through the pin P, which is common to both such components; it is however clear that the arm 13 and the movable member 30 may alternatively be associated with each other in a different manner.

[0051] In a preferred embodiment, the movable member 30 comprises a branch 30D, the movable member 30 and said branch 30D being so designed as to form a substantially L-shaped body. Said branch 30D of the movable member 30 is adapted to abut on said release means 21, in particular on the rod 21 associated with a small pump, in order to dispense the rinse aid agent contained in the container 20.

[0052] Preferably, said elastic means comprise a tongue 40 with a first portion 41A secured to the dispensing device 10 and a second portion 41B adapted to abut on the movable member 30, in particular on said branch 30D of the movable member 30.

[0053] As shown in particular in Figs. 5a, 6a and 7a, the second portion 41B of the tongue 40 abuts on the branch 30D on a side opposite to the release means 21.

[0054] In an advantageous embodiment, said first portion 41A is secured to the rear part of said dispensing device 10, in particular in the area corresponding to the compartment 11; said dispensing device 10 also includes retainers 15 for limiting the movements of the tongue 40.

[0055] Furthermore, said rod 21 comprises:

- an abutment surface 21A adapted to receive the thrust from the movable member 30, in particular from the branch 30D of said movable member 30;
- a protuberance 21P, which, in association with said pair of supports 14, limits the thrust towards the movable member 30 exerted by the small pump on the rod 21 itself.

[0056] In Figs. 3a to 7b, it can be observed that, when the pin P and said first end 31A and second end 31B of the actuating element 31 are aligned, the movable member 30 is substantially at a so-called "dead centre".

[0057] When the lid 12 is closed, the tooth 13D of the arm 13 is engaged with the serration 12D of the lid 12; the movable member 20, which is associated with the arm 13 through the pin P, is in an operating condition wherein said first end 31A and second end 31B of the actuating element 31 are aligned under the pin P (see Figs. 3a and 3b).

[0058] When the actuating element 31 is activated, it moves the movable member 30 in a first rotation direction S1 (see Fig. 4a) and causes the activation of the locking mechanism or arm 13; as a result, the rotation of the movable member 30 in said first rotation direction S1 allows the tooth 13D of the arm 13 to be disengaged from the serration 12D of the lid 12 (see Fig. 4b), thus opening the lid 12 (visible in Fig. 5b).

[0059] Since the constraint provided by the engagement between the tooth 13D of the arm 13 and the serration 12D of the lid 12 is no longer present, the movable member 30 undergoes the thrust exerted by the elastic means 40 and rotates in a second direction S2, thus overcoming the so-called "dead centre" and getting in a situation wherein said first end 31A and second end 31B of the actuating element 31 are aligned above the pin P (see Fig. 5a).

[0060] The activation of the actuating element 31 causes further movement of the movable member 30 in a second rotation direction S2, which in turn moves and activates said release means 21 to release the rinse aid agent contained in the container 20.

[0061] In particular, the repeated activation of the actuating element 31 allows to obtain successive actuations of said release means 21, in particular of the small pump associated with the rod 21, by the branch 30D of the movable member 30; said successive actuations allow to obtain a measured and metered release of the rinse aid agent contained in the container 20, said release being correlated to the number of activations of the actuating element 31.

[0062] When the wash program of the washing machine 1 has been completed, the user can close the lid 12 again in order to bring the dispensing device 10 back into the initial condition shown in Fig. 3a, i.e. with the tooth 13D of the arm 13 engaged with the serration 12D of the lid 12, and with the movable member 20 (associated with the arm 13 through the pin P) in an operating condition wherein said first end 31A and second end 31B of the actuating element 31 are aligned under the pin P.

[0063] It must be pointed out that the dispensing device 10 is shown in Figs. 7a and 7b in a condition that precedes the closing of the lid 12 by the user; in fact, the serration 12D of the lid 12 is near the tooth 13D of the arm 13.

[0064] The method of operation of the dispensing device 10 according to the present invention is apparent from the above description, said dispensing device 10 comprising:

- at least one compartment 11 associated with a lid 12 for sealing a detergent agent into said at least one compartment 11.
- a locking mechanism 13 for holding the lid 12 in the closed position;
- activating means 30, 31 for activating said locking mechanism 13 in order to open the lid 12;
- a container 20 for containing a rinse aid agent, in particular said container 20 being associated with release means 21 which allow the rinse aid agent to be dispensed during a rinse step.

[0065] In accordance with the present invention, said method of operation comprises the steps of:

a) activating an actuating element 31 comprised in said activating means 30, 31, the actuating element 31 being secured through a first end 31A to the dispensing device 10 and through a second end 31B

to a movable member 30, the activation of the actuating element 31 being such that the movable member 30 is driven in a first rotation direction S1 about a pin P so as to activate said locking mechanism 13 and open the lid 12 (Fig. 4a);
b) deactivating the actuating element 31 so that elastic means 40 associated with said movable member 30 allow the movable member 30 to switch from said first rotation direction S1 to a second rotation direction S2 about the pin P (Fig. 5a);
c) activating the actuating element 31 so as to rotate the movable member 30 in said second rotation direction S2 about the pin P in order to activate said release means 21 and dispense the rinse aid agent contained in the container 20 (Fig. 6a).

[0066] Preferably, said actuating element 31 consists of a single shape memory element and said steps a) and c) of activating the actuating element 31 are carried out by activating power supply means comprising an electric circuit (not shown in the drawings) connected to the first end 31A and/or to the second end 31B of the actuating element 31 or single shape memory element.

[0067] In a preferred embodiment, said step c) is carried out by repeatedly activating the actuating element 31, so that the release means 21, in particular a small pump associated with a rod 21, is actuated multiple times in succession by the movable member 30; this allows to obtain a measured and metered release of the rinse aid agent contained in the container 20, suited to the type of wash program being executed.

[0068] Preferably, said repeated activation of the actuating element 31 is obtained by repeatedly activating the electric circuit connected to the first end 31A and/or to the second end 31B of the shape memory element 31.

[0069] The features of the present invention, as well as the advantages thereof, are apparent from the above description.

[0070] In particular, the washing agent dispensing device for a washing machine for household use, in particular a dishwasher, the method of operation of said dispensing device and the related washing machine ensure that the washing agents are released into the wash liquid reliably and constantly over time.

[0071] They also allow the washing machine itself to handle the delivery of a predetermined quantity of washing agents, in particular of a rinse aid agent, in an electronic and dynamic manner, without the user having to set said delivery beforehand (e.g. mechanically).

[0072] As a matter of fact, the repeated activation of the actuating element 31 allows to obtain successive actuations of the release means 21, in particular of a small pump associated with a rod 21, by the movable member 30. This in turn allows to obtain a metered release of the rinse aid agent contained in the container 20 as suited to the type of wash program being executed.

[0073] A further advantage of the dispensing device, of the method of operation thereof and of the washing machine for household use according to the present invention is that the implementation of a single actuating element 31, in particular a single shape memory element, for releasing both the detergent agent and the rinse aid agent lowers the production costs of the dispensing device 1 and hence of the washing machine; in addition, such a solution turns out to be particularly flexible and comfortable.

[0074] The dispensing device, the method of operation and the washing machine described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea; it is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0075] It can therefore be easily understood that the present invention is not limited to the above-described dispensing device, method and washing machine, but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the inventive idea, as clearly specified in the following claims.

Claims

1. A washing agent dispensing device (10) for a washing machine (1) for household use, in particular a dishwasher, said dispensing device (10) comprising:

- at least one compartment (11) associated with a lid (12) for sealing a detergent agent into said at least one compartment (11);
- a locking mechanism (13) for holding the lid (12) in the closed position;
- activating means (30, 31) for activating said locking mechanism (13) in order to open the lid (12) and dispense the detergent;
- a container (20) for containing a rinse aid agent, in particular said container (20) being associated with release means (21) which allow the rinse aid agent to be dispensed during a rinse step,

characterized in that
said activating means comprise a movable member (30) rotatably mounted about a pin (P) and an actuating element (31) secured through a first end (31A) to the dispensing device (10) and through a second end (31B) to the movable member (30), said actuating element (31) being adapted to drive the movable member (30):

- in a first rotation direction (S1) about said pin (P) in order to activate said locking mechanism (13) and open the lid (12);
- in a second rotation direction (S2) about said pin (P) in order to activate said release means (21) and dispense the rinse aid agent contained

in the container (20),
said dispensing device (10) comprising elastic means (40) associated with said movable member (30) so as to allow switching from said first rotation direction (S1) to said second rotation direction (S2).

2. A dispensing device (10) according to claim 1, **characterized in that** said actuating element (31) consists of a single shape memory element, in particular of the monostable type, and the dispensing device (10) comprises power supply means including an electric circuit connected to the first end (31A) and/or to the second end (31B) of the shape memory element (31).

3. A dispensing device (10) according to claim 2, **characterized in that** said actuating element (31) may be either in a first operating condition, wherein it is not activated and has a certain first length (L1), or in a second operating condition, wherein it is activated and has a certain second length (L2), shorter than said first length (L1).

4. A dispensing device (10) according to one or more of the preceding claims, **characterized in that** said first (31A) and second (31B) ends of the actuating element (31) are positioned on substantially opposite sides relative to said pin (P).

5. A dispensing device (10) according to claim 1, **characterized in that** said locking mechanism comprises an arm (13) adapted to rotate about said pin (P), said arm (13) being fitted with a tooth (13D) adapted to engage with a serration (12D) of the lid (12).

6. A dispensing device (10) according to claim 5, **characterized in that** the arm (13) and the movable member (30) are associated with each other by means of said pin (P).

7. A dispensing device (10) according to one or more of the preceding claims, **characterized in that** said movable member (30) comprises a branch (30D).

8. A dispensing device (10) according to claim 7, **characterized in that** the movable member (30) and said branch (30D) are so designed as to form a substantially L-shaped body.

9. A dispensing device (10) according to one or more of claims 7 and 8, **characterized in that** said branch (30D) of the movable member (30) is adapted to abut on said release means (21), in particular on a rod (21) associated with a small pump or a valve, in order to dispense the rinse aid agent contained in the container (20).

10. A dispensing device (10) according to one or more of claims 1 and 7 to 9, **characterized in that** said elastic means comprise a tongue (40) with a first portion (41A) secured to the dispensing device (10) and a second portion (41B) adapted to abut on the movable member (30), in particular on said branch (30D) of the movable member (30).

11. A dispensing device (10) according to claim 10, **characterized in that** said second portion (41B) of the tongue (40) abuts on the branch (30D) on a side opposite to the release means (21).

12. A method of operation of a washing agent dispensing device (10) for a washing machine (1) for household use, in particular a dishwasher, said dispensing device (10) comprising:

- at least one compartment (11) associated with a lid (12) for sealing a detergent agent into said at least one compartment (11);
- a locking mechanism (13) for holding the lid (12) in the closed position;
- activating means (30, 31) for activating said locking mechanism (13) in order to open the lid (12);
- a container (20) for containing a rinse aid agent, in particular said container (20) being associated with release means (21) which allow the rinse aid agent to be dispensed during a rinse step,

said method being **characterized in that** it comprises the following steps:

a) activating an actuating element (31) comprised in said activating means (30, 31), the actuating element (31) being secured through a first end (31A) to the dispensing device (10) and through a second end (31B) to a movable member (30), the activation of the actuating element (31) being such that the movable member (30) is driven in a first rotation direction (S1) about a pin (P) so as to activate said locking mechanism (13) and open the lid (12);
b) deactivating the actuating element (31) so that elastic means (40) associated with said movable member (30) allow the movable member (30) to switch from said first rotation direction (S1) to a second rotation direction (S2) about the pin (P);
c) activating the actuating element (31) so as to rotate the movable member (30) in said second rotation direction (S2) about the pin (P) in order to activate said release means (21) and dispense the rinse aid agent contained in the container (20).

13. A method according to claim 12, **characterized in**

that said actuating element (31) consists of a single shape memory element, and said steps a) and c) of activating the actuating element (31) are carried out by activating power supply means comprising an electric circuit connected to the first end (31A) and/or to the second end (31B) of the actuating element (31).

14. A method according to one or more of claims 12 and 13, **characterized in that** said step c) is carried out by repeatedly activating the actuating element (31), so that the release means (21), in particular a small pump associated with a rod (21), are actuated multiple times in succession by the movable member (30).

15. A washing machine (1) for household use, in particular a dishwasher, comprising a dispensing device (10) and/or implementing a method of operation of a dispensing device (10) according to one or more of the preceding claims 1 to 14.

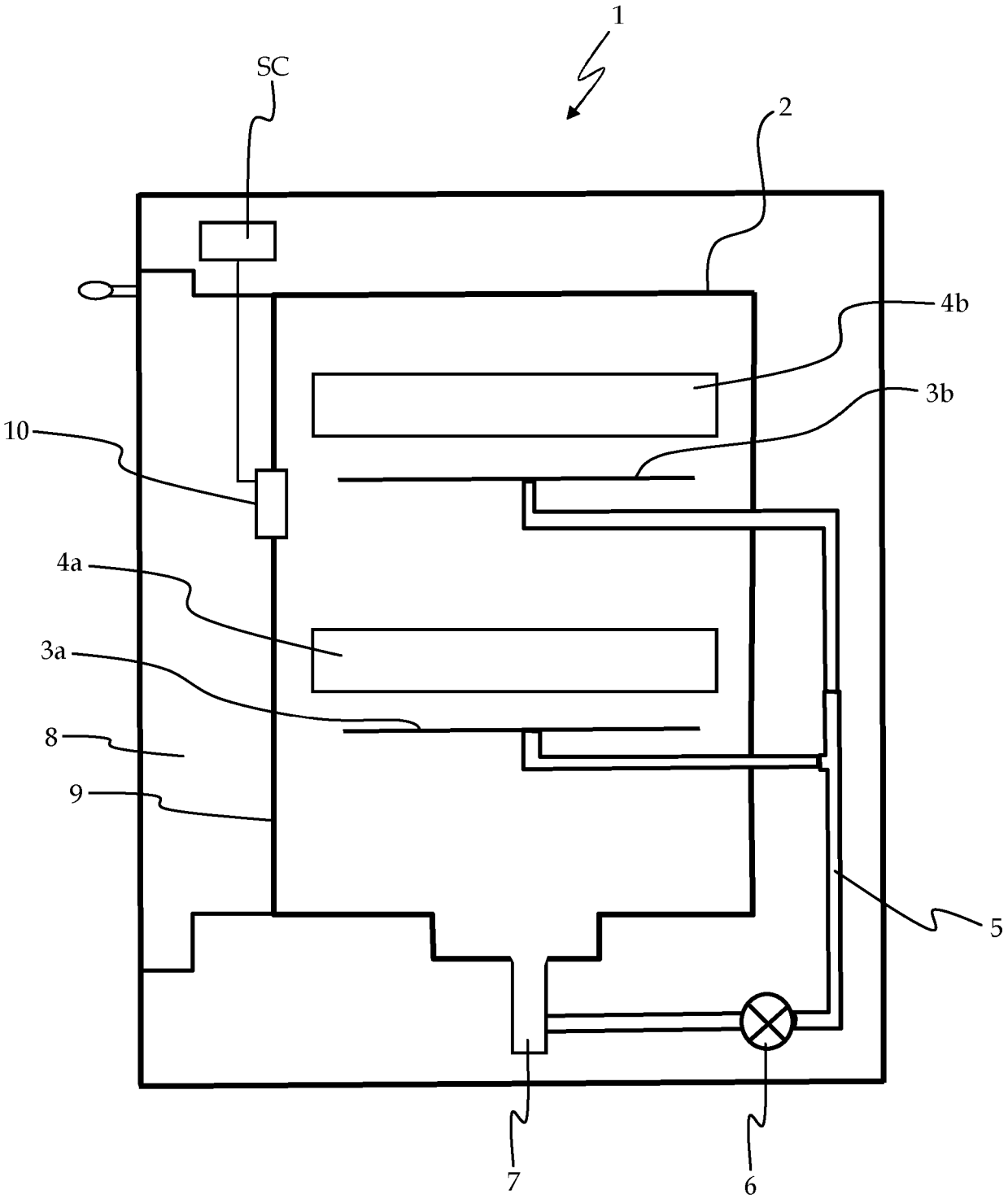


Fig. 1

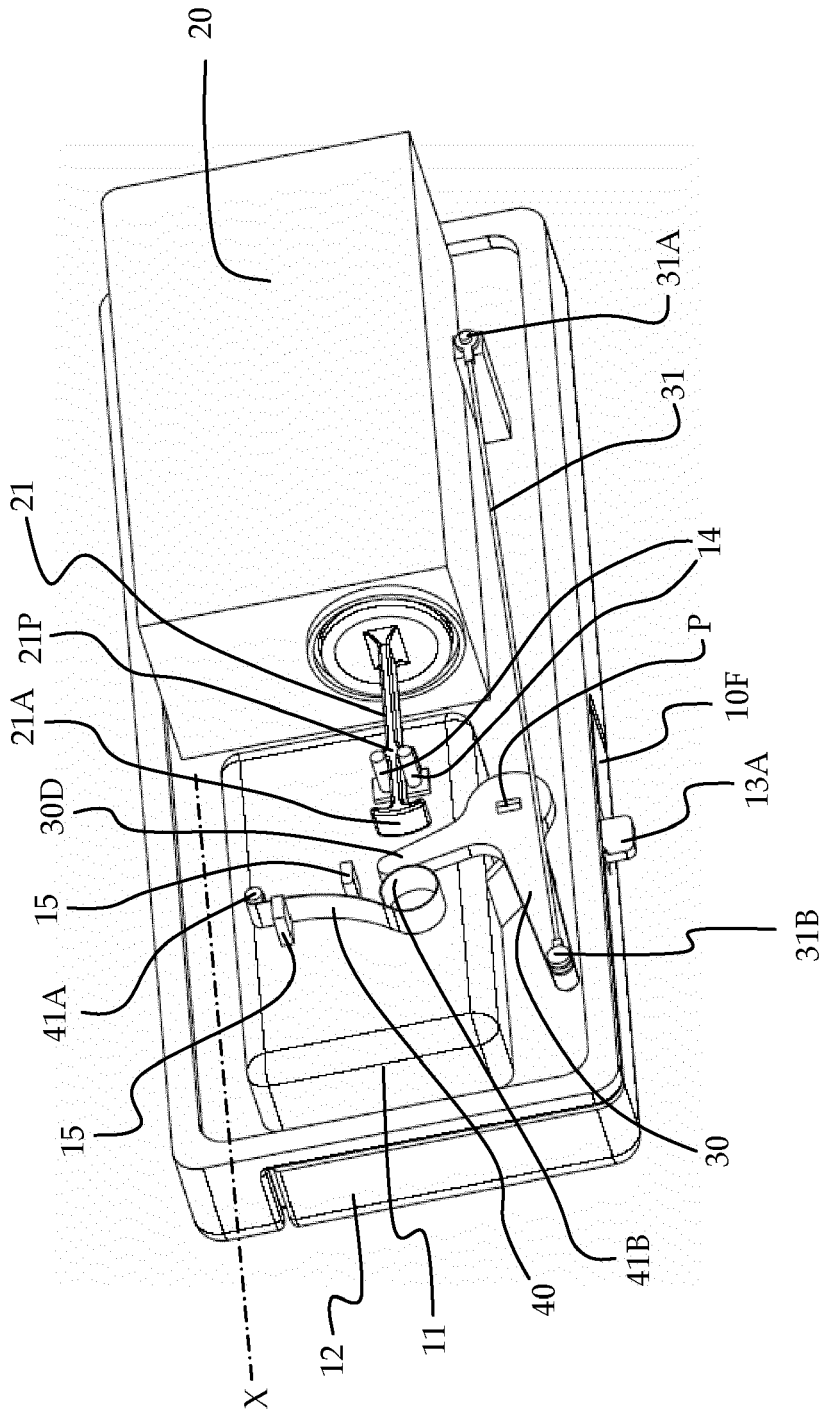


Fig. 2

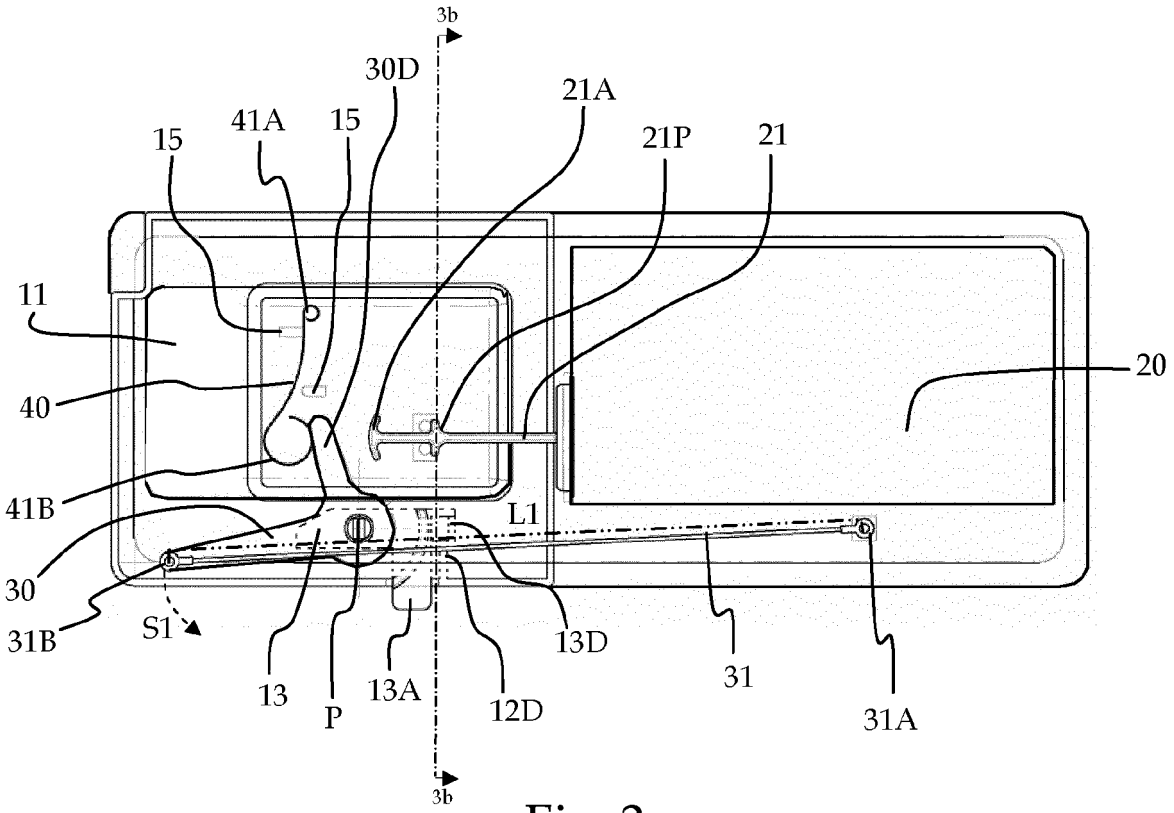

3b
30D
21A
15
41A
15
21P
21
11
20
40
41B
L1
30
31B
S1
13D
31
13
P
13A
12D
31A
3b

Fig. 3a

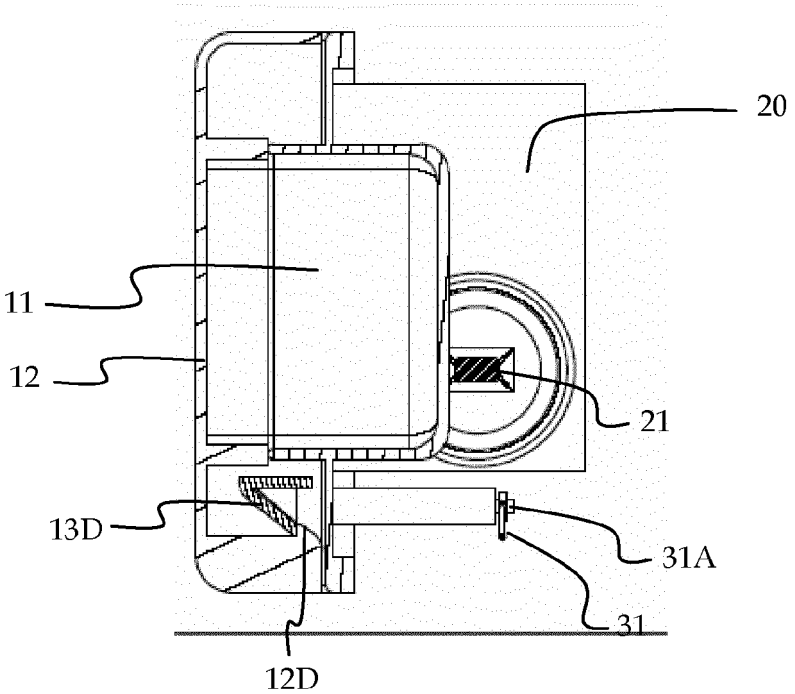

20
11
12
21
13D
31A
31
12D

Fig. 3b

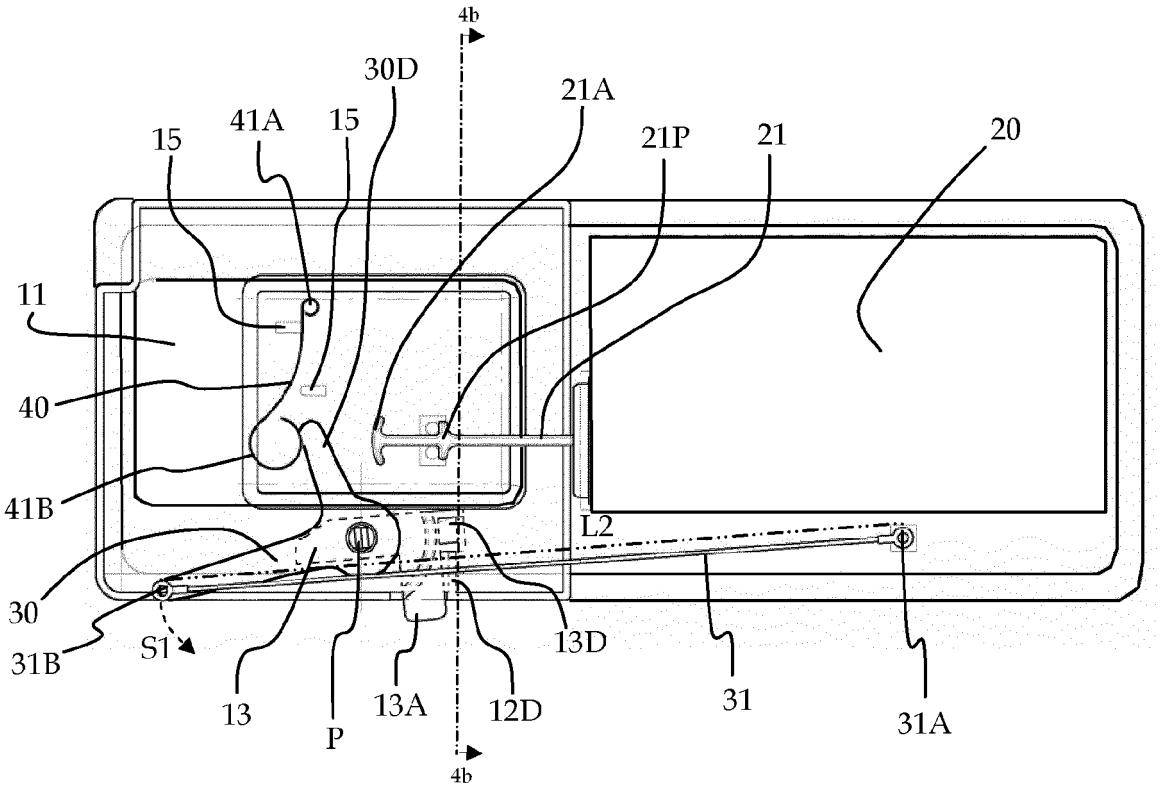
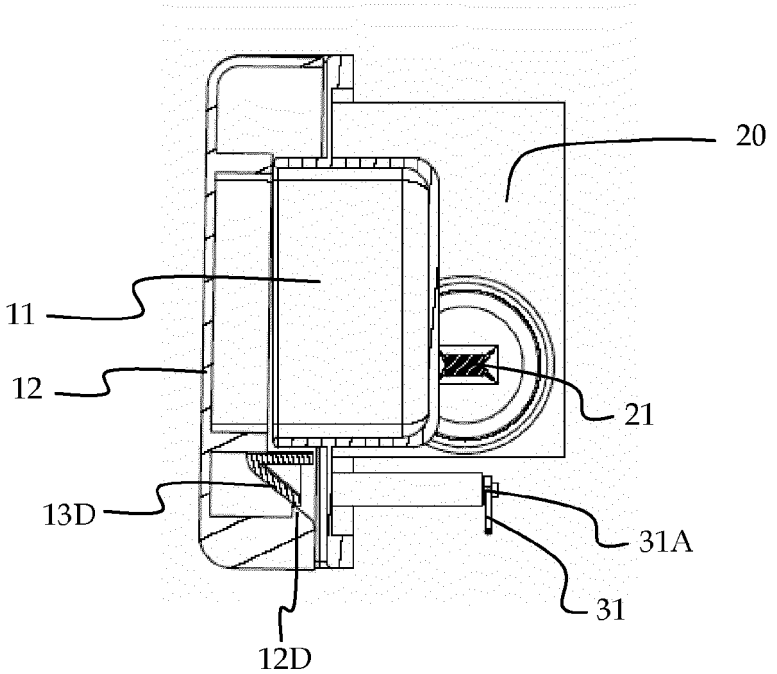

4b
30D
21A
15
41A
15
21P
21
20
11
40
41B
L2
30
31B
S1
13
P
13A
12D
13D
31
31A
4b

Fig. 4a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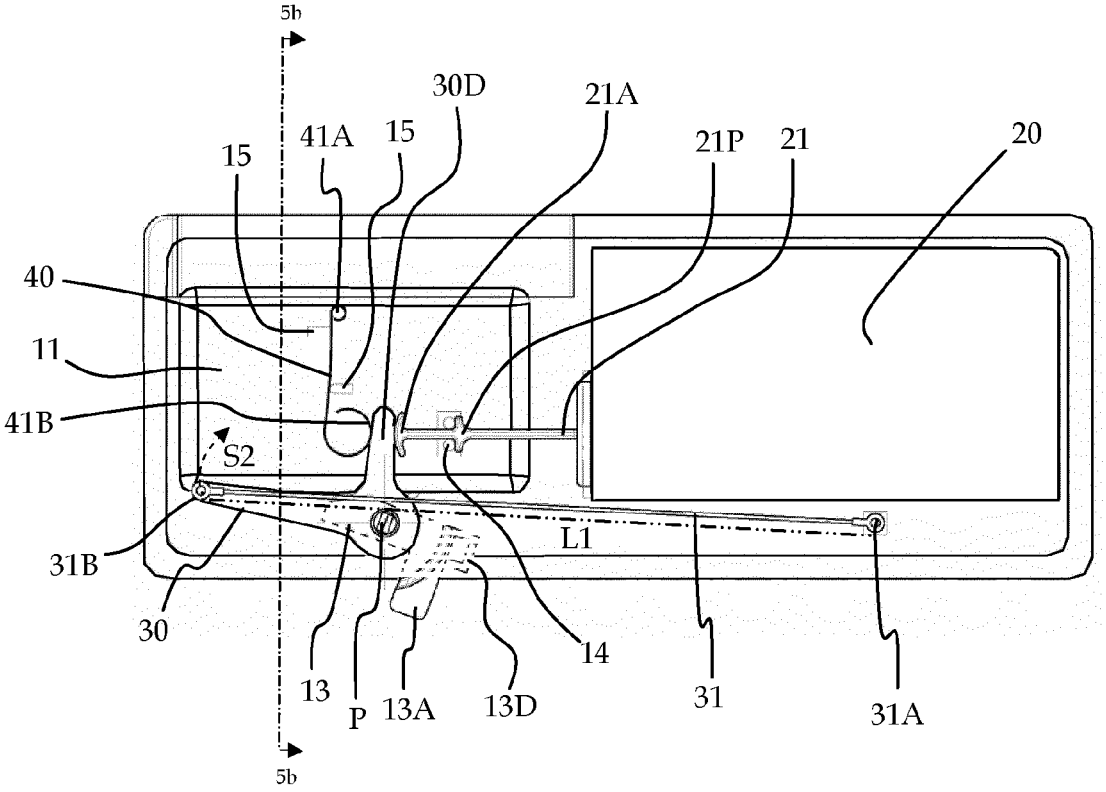
11
12
21
13D
31A
31
12D

Fig. 4b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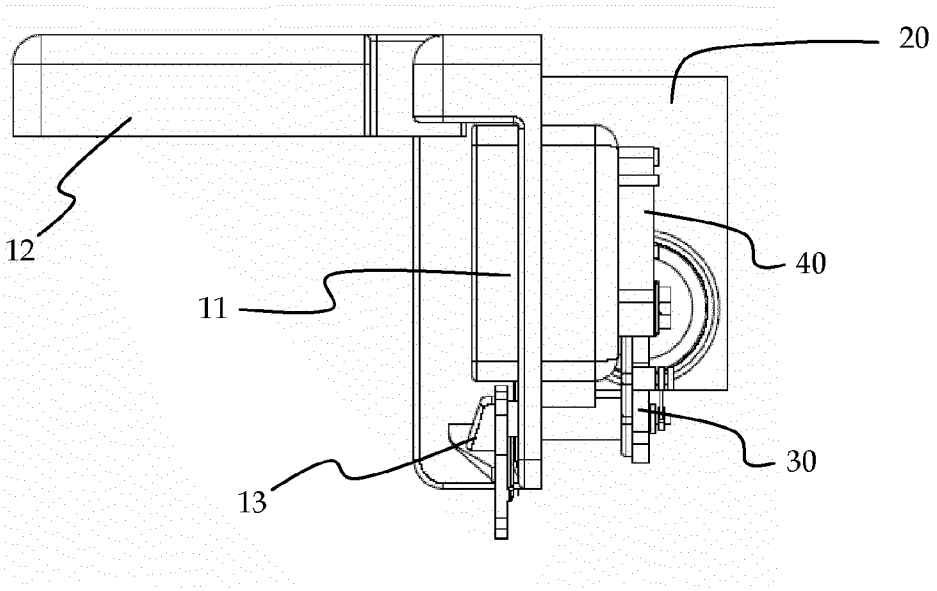
30D
21A
41A
15
15
21P
21
20
40
11
41B
S2
L1
31B
30
14
13
P
13A
13D
31
31A
5b

Fig. 5a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12
40
11
30
13

Fig. 5b

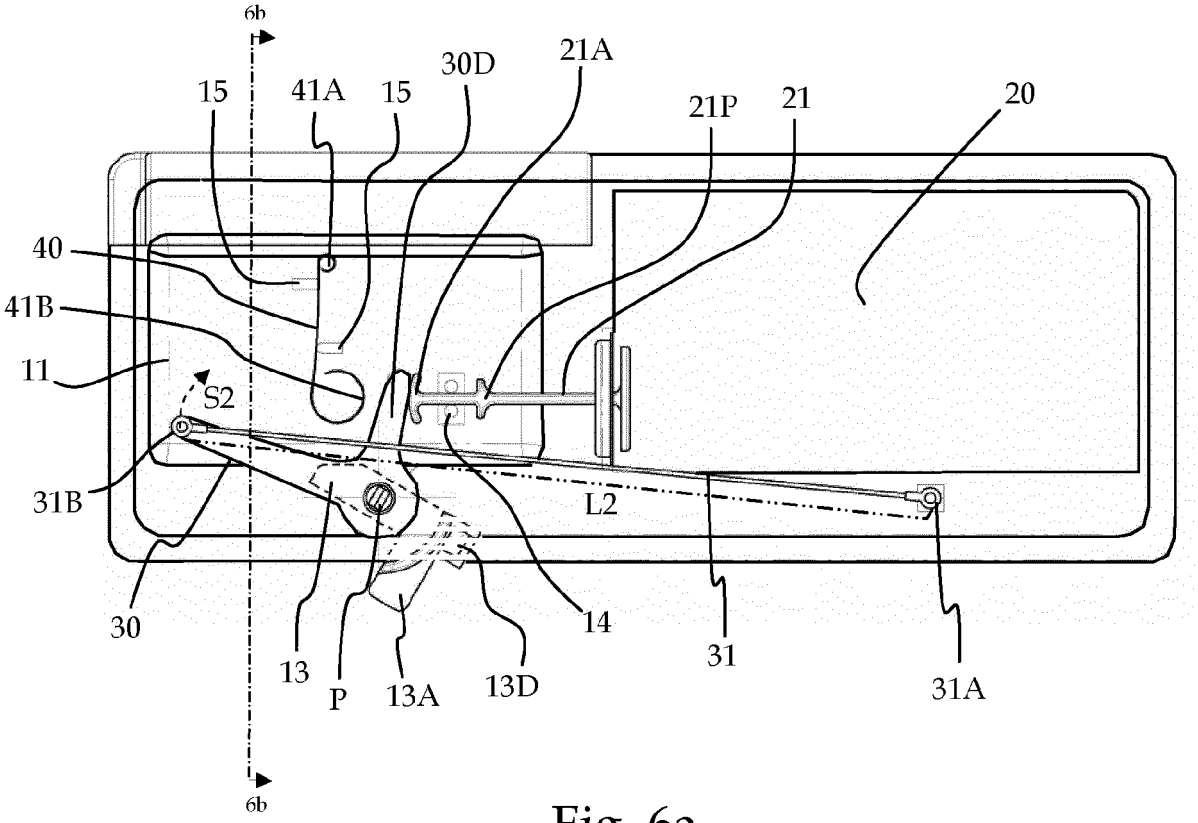
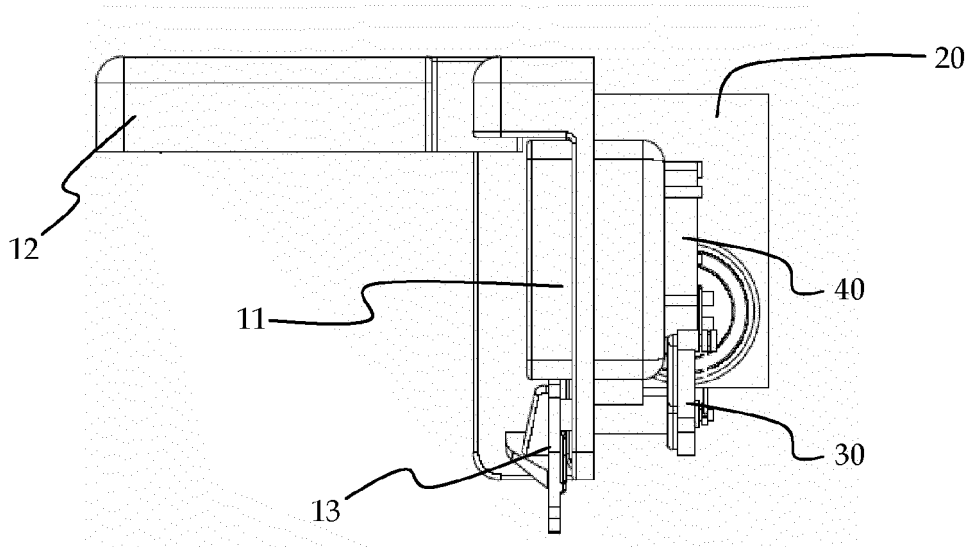

6b
15
41A
15
30D
21A
21P
21
20
40
41B
11
S2
31B
L2
30
13
P
13A
13D
14
31
31A
6b

Fig. 6a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12
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11
30
13

Fig. 6b

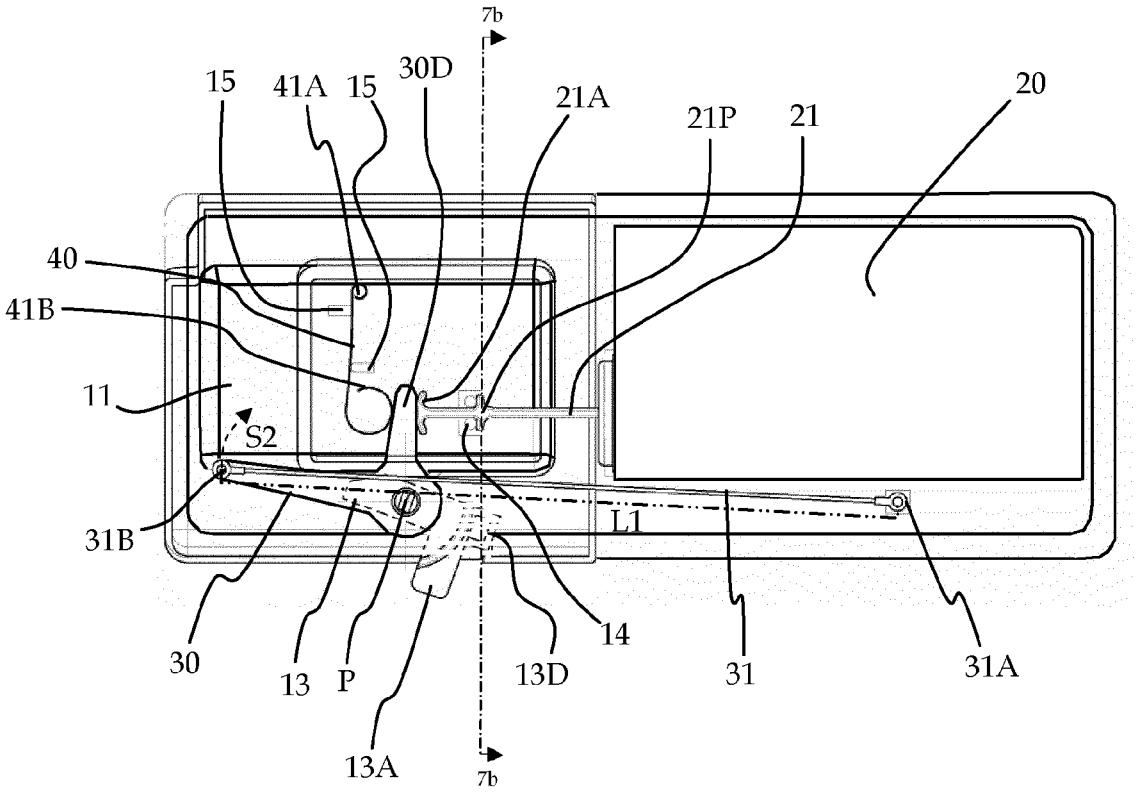
7b
15
41A
15
30D
21A
21P
21
20
40
41B
11
S2
31B
L1
30
13
P
13A
13D
14
31
31A
7b

Fig. 7a

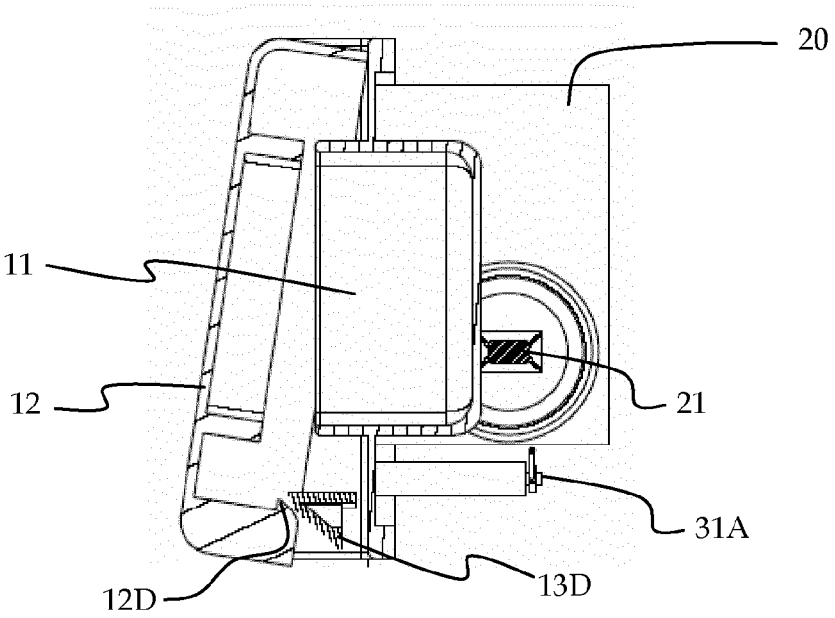
20
11
12
21
31A
12D
13D

Fig. 7b

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 1540

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 March 2012	Martin Gonzalez, G

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